

REMARKSIN THE SPECIFICATION:

At page 1, in original line 3, BEFORE the words "The United States Government" the SECTION HEADING -- STATEMENT OF GOVERNMENT INTEREST -- is ADDED. The change is made to conform this section with all subsequent sections by identifying it with a proper heading.

At page 1, in original line 17, the word "know" is DELETED and REPLACED with the word -- known -- to correct the syntax of the sentence.

At page 2, in original line 15, the word "that" [*first occurrence*] is DELETED to correct a typographical error wherein the word was mistakenly included twice. In original line 16 the word "act" is DELETED and REPLACED with the word -- acts -- to correct the syntax of the sentence. In original line 24, AFTER the words "based on" the article -- a -- is INSERTED to correct the syntax of the sentence.

At page 4, in original line 22, the word "show" is DELETED and REPLACED with the plural form -- shows --, to correct the syntax and grammar of the sentence.

At page 5, in original line 8, the word "absorbed" is DELETED and REPLACED with the word -- absorb -- to correct the syntax and grammar of the sentence.

At page 6, in original line 2, AFTER the words "While not attempted" a comma is INSERTED; AFTER the word "dry" the word "gas" is DELETED and REPLACED with the word -- gases -- to correct the grammar and punctuation of the sentence.

At page 8, in original lines 12, the word "it" BEFORE the word "maximum" is DELETED and REPLACED with the word -- its -- to correct the spelling of this word.

At page 9, in original line 5 the word "time" AFTER the words "repeated several" is DELETED and REPLACED with the word -- times --; in original line 11, the article "the" AFTER the indefinite article "a" is DELETED; and in original line 23 the word "takes" AFTER the words "is seen" is DELETED and REPLACED with the word -- taking -- to correct the syntax of these sentences.

At page 9, original line 1, the words "as to the" are DELETED and REPLACED with the word -- that -- in order to correct the syntax of the sentence. In original line 30, the word "value" is made plural in order to conform it to the plural form of the verb "are".

At page 10, at original line 24, the word "bottom" AFTER the words "displayed as the" is DELETED and replaced with the word -- lowest --; at original line 26, the word "demonstrates" is DELETED and REPLACED with the word -- demonstrate --; and at original line 28, AFTER the words "hydrides may" the word -- be -- to correct the syntax and grammar of these sentences.

Applicants assert that no new matter has been included as the result of these amendments.

IN THE CLAIMS:

Applicants have canceled original claims 2, 3, 6, 7, 9, 13, 14, 17, 18, 20, and 23 – 26, and amended original claims 1, 4, 5, 8, 11, 12, 15, 16, 19, 22 to better claim their invention.

IN CLAIM 1

In line 1 of the claim the word “of” is DELETED and REPLACED with the word -- for --, and the words “one or more” are DELETED. The changes are made to more explicitly claim the invention.

In line original line 3 of the claim, the word “mixing” is DELETED and REPLACED with the word -- processing --; the words “alkali metal hydride” are DELETED and REPLACED with the words -- mixture of NaH powder --; the word “with” BEFORE the word “aluminum” is DELETED, and a comma is INSERTED AFTER the words “aluminum powder”. The changes are made to better describe the invention. Support for “processing” is found in the inherency of Applicants' written description throughout the specification but especially at page 2, line 24, page 4, lines 3, 8, 13 and 18, and at page 8, line 8. Support for “mixture of NaH powder” is found at page 7, line 7, page 8, line 5, and at page 10, line 6. The remaining changes were made to correct punctuation and grammar.

In original line 4 of the claim, AFTER the word “compound” the words and comma -- selected from the list consisting of TiCl₃, TiF₃, and mixture thereof, -- are INSERTED; the word “order” AFTER the word “in” is DELETED and the words -- a high energy refractory ball mill for about 2 hours -- are ADDED. The changes are made to better describe the invention. Support for including the Markush group is found in original claim 3, now canceled. Support for the addition of “a high energy refractory ball mill for about 2 hours” is found throughout the Applicants' written description and particularly at page 6, lines 15 – 21, and page 7, line 14 and in the characterization of the balls and mill lining as “tungsten carbide” throughout the specification.

In original line 7 of the claim, the words “one of more alkali metal aluminum” are DELETED and replaced with the word “complex”, and the words -- comprising NaAlH₄ and Na₃AlH₆ -- are INSERTED AFTER the words “hydride compounds” and BEFORE the period ending the sentence. The changes are made to clarify the end result of the instant process. Support for “complex” is found in line 1 of original claim 1. Support for “comprising NaAlH₄ and Na₃AlH₆” is found in original claim 24, now canceled and at page 7, line 6, . page 8, line 4, page 10, line 4, and in FIG. 10

CLAIMS 2 AND 3 ARE CANCELED

IN CLAIM 4

In original line 1 of the claim, the dependency is amended to refer to claim 1 in order to account for the cancellation of claim 2. The words "said alkali metal hydride" are DELETED and REPLACED with the words -- the NaH powder -- to comport this claim with amended claim 1.

IN CLAIM 5

In original line 1 of the claim, the dependency is amended to refer to claim 1 in order to account for the cancellation of claim 2. The words "alkali metal hydride" are DELETED and REPLACED with the words -- NaH powder -- to comport this claim with amended claim 1.

CLAIMS 6, 7 AND 9 ARE CANCELED

IN CLAIM 8

In original line 1 of the claim, the word "mechanically mixing" in the first line of the claim is DELETED and REPLACED with the word -- processing -- to comport this claim with newly amended claim 1.

CLAIM 10 IS UNCHANGED

IN CLAIM 11

In original line 1 of the claim, the dependency of the claim is amended to refer to claim 10 in order to better describe the claim.

IN CLAIM 12

In line 1 of the claim the word "of" is DELETED and REPLACED with the word -- for --, and the words "one or more" are DELETED. The changes are made to more explicitly claim the invention.

In line original line 3 of the claim, the word "mixing" is DELETED and REPLACED with the word -- processing a mixture of --; the words "an alkali" are DELETED and REPLACED with the words -- sodium --; the word "with" BEFORE the word "aluminum" is DELETED, and a comma is INSERTED AFTER the words "aluminum powder". The changes are made to better describe the invention. Support for "processing" is found in the inherency of Applicants' written description throughout the specification but especially at page 2, line 24, page 4, lines 3, 8, 13 and 18, and at page 8, line 8. Support for "mixture of a comminuted form of Na" is found in original claim 1, and at page 8, line 27. The remaining changes were made to correct punctuation and grammar.

In original line 4 of the claim, AFTER the word "compound" the words and comma -- selected from the list consisting of TiCl₃, TiF₃, and mixture thereof, -- are INSERTED; the word "order"

AFTER the word “in” is DELETED and the words -- a high energy refractory ball mill for about 2 hours to about 4 hours -- are ADDED. The changes are made to better describe the invention. Support for including the Markush group is found in original claim 3, now canceled. Support for the addition of “a high energy refractory ball mill for about 2 hours to about 3 hours” is found throughout the Applicants’ written description and particularly at page 6, lines 15 – 21, at page 9, line 1 – 8, and in the characterization of both the mill balls and the mill lining as “tungsten carbide” throughout the specification.

In original line 7 of the claim, the words “one of more alkali metal aluminum” are DELETED and replaced with the word “complex”, and the words -- comprising NaAlH₄ and Na₃AlH₆ -- are INSERTED AFTER the words “hydride compounds” and BEFORE the period ending the sentence. The changes are made to clarify the end result of the instant process. Support for “complex” is found in line 1 of original claim 1. Support for “comprising NaAlH₄ and Na₃AlH₆” is found in original claim 24, now canceled and at page 7, line 6, . page 8, line 4, page 10, line 4, and in FIG. 10

CLAIMS 13 AND 14 ARE CANCELED

IN CLAIM 15

In original line 1 of the claim, the dependency is amended to refer to claim 12 in order to account for the cancellation of claims 13 and 14; and the word “alkali” is DELETED and REPLACED with the word -- sodium -- to account for the amendments to claim 12. Support for the latter change is found in original claim 13, now canceled.

IN CLAIM 16

In original line 1 of the claim, the dependency is amended to refer to claim 12 in order to account for the cancellation of claims 13 and 14.

In line 2 of the claim, the word “alkali” is DELETED and REPLACED with the word -- sodium -- to account for the amendments to claim 12. Support for the latter change is found in original claim 13, now canceled. The comma and words -- , and wherein about 10% of said sodium metal is added step-wise to the mixture at intervals of about 20 minutes each -- are INSERTED at the end of the sentence BEFORE the period in order to better describe the invention.

Support is found at page 9, lines 3 – 7 of the written description.

CLAIMS 17, 18 AND 20 ARE CANCELED

IN CLAIM 19

In original line 1 of the claim, the word "mechanically mixing" in the first line of the claim is DELETED and REPLACED with the word -- processing -- to comport this claim with newly amended claim 12.

CLAIM 21 IS UNCHANGED

IN CLAIM 22

In original line 1 of the claim, the dependency of the claim is amended to refer to claim 21 in order to better describe the invention.

CLAIMS 23 THROUGH 26 ARE CANCELED

OBJECTION TO THE CLAIMS UNDER 35 U.S.C. §112

Examiner's § 1

Examiner has objected to claims 1, 7, and 25 because of the following informalities.

In claim 1, in the third line after the word "mixing", the article "a" should be changed to -- an --, and after the word "hydride" the word -- powder -- should be inserted;

in claim 1, in the seventh line after the word "one", the word "of" should be changed to -- or --;

in claim 7, in the second line after the word "alkali", the word -- metal -- should be inserted;

in claim 25, in the sixth line after the word "to", the article -- a -- should be inserted.

Examiner requires appropriate correction.

Applicants' Response

Applicants thank the Examiner for her observations and suggestions and herein respectfully request cancellation of claims 7 and 25 and amended claims 1 to correct the noted deficiencies.

REJECTION UNDER 35 U.S.C. §102(a)

Examiner's § 2

The Examiner has rejected claims 1 – 6, 8, 10 – 17, 19 and 21 – 26 under 35 U.S.C. §102(a) as being anticipated by Bogdanovic, et al., (US Patent Application Publication Number 2003/0053948 A1) in that:

"In regards to claims 1 and 12, Bogdanovic et al disclose a method for producing hydride compounds capable of reversible hydrogenation, comprising: mechanically mixing an aluminum powder, with a finely powdered alkali metal hydride or alkali metal and a titanium-containing catalyst; and hydrogenating the powdery mixture at an elevated pressure and temperature to provide and alkali metal aluminum hydride compound (See [0007] and [0012] of US Application Publication).

In regards to claims 2 and 13, Bogdanovic et al disclose that the alkali metal or alkali metal hydride may be any of Na, K, Li, NaOH, KH, or LiH (See [0014] and [0030]).

In regards to claims 3 and 14, Bogdanovic et al disclose that the titanium catalyst may be in halides form and exemplifies his invention with the use of TiCl₃ (See [0014] and [0030]).

In regards to claims 4 and 15, Bogdanovic et al disclose an aluminum powder to alkali metal hydride powder between 1:0.3 to 1:5 (see claim 5 of US Application Publication).

In regards to claims 5 and 16, Bogdanovic et al disclose transition metal catalyst (i.e. titanium) in amounts of from 0.1 to 10 mole percent, based on aluminum (see claim 16 of US Application Publication).

In regards to claims 6 and 17, Bogdanovic et al disclose mechanically mixing, stirring or milling the powders (See [0012] and claim 17 of US Application Publication).

In regards to claims 8 and 19, Bogdanovic et al disclose stirring the powders under a protective gas of argon (See [0012] of US Application Publication).

In regards to claims 10, 11, 21 and 22, Bogdanovic et al disclose causing the hydrogenation at temperatures in the range from 20 to 200° C and at pressures in the range between 5 and 150 bar (1 bar = 1 atm) and the hydrogenation lasting from 3.8 to 24 hours (See Table 1, [0012]) and claim 18 of US Application Publication).

In regards to claims 23 and 24, Bogdanovic et al disclose one or more complex alkali metal aluminum hydrides that exhibit reversible hydrogenated and dehydrogenated states and wherein said hydrides comprises NaAlH_4 and Na_3AlH_6 (See claims 1,5 and 7).

In regards to claims 25 – 26, Bogdanovic et al disclose dehydrogenation by heating the alkali metal aluminum hydride thereby producing a supply of hydrogen gas and a dehydrogenated form of the alkali metal aluminum hydride and hydrogenating or regenerating the alkali metal aluminum hydride by exposing the dehydrogenated hydride to a source of hydrogen gas (See [0012] of US Application Publication).

No difference is seen between the instantly claimed invention and Bogdanovic et al.”

Applicants' Response

Applicants again thank the Examiner for her remarks but respectfully *disagree* with her conclusions.

Applicants have requested that claims 2, 3, 6, 7, 9, 13, 14, 17, 18, 20, 23 – 26 be canceled without prejudice and have therefore remove the grounds for the rejection in these claims.

In the remaining claims, Applicants will limit their remarks to independent claims 1 and 12 only, since of *all* remaining claims depend ultimately from one of these two claims. Furthermore, Applicants note that in order to maintain a rejection based on anticipated under §102(b), MPEP §2131 requires that the Examiner provide a single reference that teaches or

enables each of the claimed elements (arranged as in the instant claim, expressly or inherently, as interpreted by one of ordinary skill in the art (emphasis added)).

The Examiner has characterized the Bogdanovic, et al., ('948) invention as "...a method for producing hydride compounds capable of reversible hydrogenation, comprising: mechanically mixing an aluminum powder, with a finely powdered alkali metal hydride or alkali metal and a titanium-containing catalyst ...". Applicants note, however, that Bogdanovic, et al., claim only "A method for reversibly storing hydrogen...", while Applicants disclose and claim "A method for producing complex hydride compounds ... comprising ...". Furthermore, in none of their Examples do Bogdanovic, et al., teach nor do they claim to form a mixture of the three constituent powders and then to process the powder mixture "in a high energy refractory ball mill", nor do they teach to process these powders in a ball mill "for about 2 hours" as do the Applicants. Instead, Bogdanovic, et al. direct the reader to "stir" aluminum powder with a powder of sodium hydride ([0024], line 1 – 4) and "then" slowly add the titanium catalyst and to continue stirring "for a short time" ([0024], line 7).

Applicants assert, therefore, that their claims 1 and 12 are *not* taught by Bogdanovic, et al., ('948) in that Bogdanovic, et al., ('948) do not disclose providing a mixture of constituent powders and then processing that mixture "... in a high energy refractory ball mill", nor do they teach or disclose to process the powders "... for about 2 hours". Because MPEP §2131 requires as a condition for sustaining a finding of anticipation, that ALL claimed elements are either taught or enabled in the cited reference, and because the Applicants have now shown that Bogdanovic, et al., ('948) do not teach or disclose several of the claimed elements, the conditions for maintain a finding of anticipation cannot be met. Moreover, because remaining claims 4, 5, 8 – 11, 15, 16, 19 – 22 ultimately depend from amended claims 1 and 12, and because, by definition, dependent claims merely narrow the scope of the independent claim by adding additional elements and/or limitations, it is not possible to maintain a finding of anticipation in the dependent claim without also finding anticipation in the independent claim.

Applicants consequently assert that they have overcome the Examiner's rejection under 35 U.S.C. §102(b) with regard to amended independent claims 1, and 12 and to amend claims 4, 5, 8 – 11, 15, 16, 19 – 22 and herein respectfully request the Examiner to reconsider and withdraw her rejection in these claims and pass them to allowance.

REJECTION UNDER 35 U.S.C. §102(a)*Examiner's § 2*

The Examiner has rejected claims 23 – 26 under 35 U.S.C. §102(b) as being anticipated by Bogdanovic, et al., (US Patent Number 6,106,801).

Applicants' Response

Applicants thank the Examiner for her remarks but respectfully note that they have requested that claims 23 – 26 be canceled and have therefore removed the grounds for this rejection. Applicants, therefore, respectfully request that the Examiner withdraw her rejection in so far as these claims are now moot.

REJECTION UNDER 35 U.S.C. §103(a)*Examiner's § 2*

The Examiner has rejected claims 7, 9, 18, and 20 under 35 U.S.C. §103(a) as being unpatentable over by Bogdanovic, et al., (US Patent Application Publication Number 2003/0053948 A1) as applied to claims 1 – 6, 8, 10 – 17, 19, and 21 – 26, and further in view of Zaluska, et al., (WO 99/19250).

Applicants' Response

Applicants again thank the Examiner for her remarks but respectfully note that they have requested that claims 7, 9, 18, and 20 be canceled and have therefore removed the grounds for this rejection. Applicants, therefore, respectfully request that the Examiner withdraw her rejection in so far as these claims are now moot.


CONCLUSION

In summary, Applicants assert they have cured the rejections under 35 U.S.C. §112, §102 and §103 and have shown that the instant invention claims a unique method that is neither anticipated, suggested nor taught by the prior art. Favorable reconsideration of claims now presented and allowance of this application is earnestly solicited.

This response is therefore:

Respectfully submitted by,

SANDIA NATIONAL LABORATORIES



Timothy Evans, Agent
Registration No. 41,013

P.O. Box 969, MS 9031
Livermore, CA 94551-0969
Telephone (925) 294 - 3690

Attachments:

PTO/SB22 Petition for Extension of Time
PTO/SB17 Fee Transmittal
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I hereby certify that this Correspondence and documents referred to herein were deposited with the United States Postal Service as first class mail addressed to: Mail Stop Non Fee Amendment, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450

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